

What is claimed is:

- 1 1. An apparatus useful for disposal of hydrogen in a fluid comprising
2 hydrogen and residual amounts of HF and aerosol electrolyte from a fluorine generator,
3 the apparatus comprising:
 - 4 a) an electrolyte aerosol removal unit comprising an aerosol removal
5 composition therein through which the fluid is adapted to flow;
 - 6 b) a catalytic unit comprising a catalytically activated combustion surface, the
7 catalytic unit adapted to be positioned inside of a forced convection duct,
8 the catalytic unit fluidly connected to the aerosol removal unit by a
9 conduit, the catalytically activated combustion surface adapted to combust
10 the hydrogen in an oxygen-containing stream, typically air or exhaust
11 gases comprising air flowing through the forced convection duct.
- 1 2. The apparatus of claim 1 wherein the apparatus is modular.
- 1 3. The apparatus of claim 1 wherein the apparatus is portable.
- 1 4. The apparatus of claim 1 wherein the aerosol removal component is in bed
2 form.
- 1 5. The apparatus of claim 1 wherein the aerosol removal composition
2 comprises a composition selected from the group consisting of soda lime, sodium
3 fluoride, heated activated aluminum oxide, finely divided nickel, or combination thereof.
- 1 6. The apparatus of claim 1 wherein the conduit that fluidly connects the
2 aerosol removal unit and the catalytic unit is selected from the group consisting of a
3 nickel tube and a nickel-lined tube.
- 1 7. The apparatus of claim 1 wherein the aerosol removal unit is maintained at
2 a temperature ranging from about 25°C to about 200°C.
- 1 8. The apparatus of claim 1 wherein the catalytic unit is maintained at a
2 temperature of at least 70°C.

1 9. The apparatus of claim 1 wherein the catalytic unit is maintain at a
2 temperature of at least 200°C.

1 10. The apparatus of claim 1 wherein the catalytically activated combustion
2 surface is maintain at a temperature of at least 70°C.

1 11. The apparatus of claim 10 wherein the catalytically activated combustion
2 surface is maintain at a temperature of at least 200°C.

1 12. The apparatus of claim 1 wherein the aerosol removal unit and catalytic
2 unit are position at a distance from a fluorine generator.

1 13. The apparatus of claim 1 wherein the aerosol removal unit and the
2 catalytic unit are mounted on top of and within the footprint of a fluorine generator.

1 14. The apparatus of claim 1 wherein the catalytically activated combustion
2 surface comprises one or more layers of wire screen, wherein individual wires of the wire
3 screen may be the same or different in composition, diameter, and orientation.

1 15. The apparatus of claim 14 wherein the catalytically activated combustion
2 surface is a 10-ply layer of 95 percent platinum, 5 percent rhenium alloy screen.

1 16. A method for disposal of hydrogen in a fluid comprising hydrogen and
2 residual amounts of HF and aerosol electrolyte from a fluorine generator, the method
3 comprising the steps of:

4 a) flowing the fluid through an electrolyte aerosol removal component
5 comprising an aerosol removal composition, wherein the fluid contacts
6 the aerosol removal composition thereby forming a hydrogen-rich fluid
7 reduced in aerosol; and

8 b) contacting the hydrogen-rich fluid reduced in aerosol with a
9 catalytically activated combustion surface positioned inside of a forced
10 convection duct, while a gas comprising oxygen flows through the
11 forced convection duct, thereby combusting the hydrogen with oxygen
12 in the oxygen-containing stream.

1 17. An apparatus useful for generating fluorine, the apparatus comprising:
2 a) a fluorine generator adapted to produce a hydrogen-rich fluid; and
3 b) the apparatus of claim 1, wherein the aerosol removal unit is fluidly
4 connected to the fluorine generator and adapted to accept the
5 hydrogen-rich fluid.

1 18. A method for generating fluorine and disposal of by-product hydrogen in a
2 fluid comprising hydrogen, residual amounts of HF and aerosol electrolyte from a
3 fluorine generator, the method comprising the steps of:
4 a) generating a fluorine-rich stream and a hydrogen-rich stream, the
5 hydrogen-rich stream comprising minor amounts of electrolyte and
6 hydrogen fluoride;
7 b) routing the fluorine-rich stream to a cleanup train to produce a purified
8 fluorine stream; and
9 c) routing the hydrogen-rich stream to the apparatus of claim 1, thereby
10 substantially reducing the aerosol content and combusting the hydrogen.